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Information Labs: The Next Best Thing in Information Literacy Instruction?

Michael Fosmire
Purdue University, fosmire@purdue.edu

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Michael Fosmire
Head, Physical Sciences, Engineering, and Technology Division
Purdue University Libraries
fosmire@purdue.edu

ABSTRACT

As higher education transforms itself from a lecture-dominated enterprise to one that encourages active engagement by the students with the curriculum, librarians have a new avenue for inserting themselves into the educational mission of the university. At Purdue University, the libraries have been successful integrating problem-based learning activities into curricula in several departments. One of the most successful ventures at Purdue has been in the Earth and Atmospheric Sciences, where, in addition to our regular instructional presence, we have created 'information labs' in two courses so far, including the first year survey course taken by all EAS majors.

The information lab takes the place of a regular lab in those classes, and involves the students tackling a research project, solving it, and writing up the results in some format. The lab uses a problem-based learning methodology, where students take ownership of a problem or situation, determine what their learning issues are, and then go about resolving those learning issues to solve their problem. The instructor acts as a guide, answering questions and guiding students through the process of problem solving, rather than standing up front and demonstrating databases for the students. The students work in small groups to facilitate peer learning as well, which has been shown to be a preferred method for students to learn. Since the information lab takes the students through all the steps in the problem-solving process, it naturally addresses each of the ACRL information literacy competencies, providing a well-rounded introduction to information literacy to the students. This paper describes the two information labs that have been created for the geosciences, one in the survey course, and one in mineralogy.

INTRODUCTION

There is a growing movement in higher education away from traditional lecturing methods, toward an active, learner-centered approach to education. In order to remain effective partners with subject faculty, librarians need to be able to adapt to changes in instructional techniques, and indeed provide leadership to subject faculty by offering cutting edge techniques for their classroom. One example of learner centered instruction is the creation of Information Labs at Purdue University. Taking the place of one or two regular lab sessions, Information Labs build on the active learning that traditionally takes place in laboratory classes, only in this case the topic is being analyzed by using outside information (outside the course textbook and reserves), rather than from an experimental apparatus.

Traditionally, lecture-based instruction was seen as the best way to transfer information from the instructor's head into the students' brains. However, in this situation, students are passive recipients of information and tend not to be able to explore, grapple with, or try out concepts or techniques until much later, when they've forgotten most of what the lecture was about. Alternatively, in an active-learning environment, students are encouraged to develop their own intuition, build up an idea of how things work within their own conceptual framework, test assumptions, and reconceptualize their conclusions if their predictions don't pan out. By intellectually engaging the content, students are more likely to master the concepts, than in a passive, lecture-driven format.

There are many ways to provide active learning experiences as part of information literacy instruction. *Designs for Active Learning* (Gradowski, Snavely, and Dempsey, 1998), for example, provides a compilation of active learning activities for a variety of situations. For the information labs discussed below, a problem-based learning approach was used to structure the information activities. Macklin (2001) explains the basic framework of problem-based learning applied to information literacy experiences, and Fosmire and Macklin (2002) discuss this and other actual applications of PBL to coursework. For general information on the problem-based learning methodology, Duch, Groh, and Allen (2001) provide excellent examples of problem-based learning applied to science instruction, and Fogarty (1997) has created an easy to read workbook of problem-based learning activities.

In general, the problem-based learning method involves the following steps. The instructor presents a problem or scenario. The students restate the problem to articulate their specific information needs. They determine the key concepts they need to search, locate the information from some databases or print resources, analyze the information they get, synthesize it to form conclusions about their problem, and use the information correctly to present their conclusions to the rest of the class. This method naturally addresses all of the major facets of the Information Literacy Competency Standards (ACRL, 2002).

THE INFORMATION LAB

The specific case of an introductory earth and atmospheric sciences class, required of all majors at Purdue, will be used as an example. A problem is presented to the students. For example,

> *Everyone is talking about global warming. As a legislative aide, you need your boss to stay in power, so you can keep your job. Recommend a policy about global warming that will make your congressperson look good and ensure their re-election.* ***Specifically:*** *Your working group has been selected to provide a recommendation concerning X as a possible solution to the global warming situation. For the next lab, prepare a presentation showing why your recommendation should be endorsed by your boss.*

The students are then asked to determine the key concepts of the problem, and to articulate their problem statements. The instructors facilitate this by giving the students a KND-type worksheet, that asks, What do you Know already? What do you Need to know to solve your problem? What do you need to Do to find that information? This sets the stage for the information seeking process. The instructors circulate around the room to facilitate the completion of the KND worksheets, and students work in small groups of around 3-5 members, to maximize the level of peer learning that occurs. One group is then asked to present their worksheet to the rest of the class as a model, and the entire class discusses the good points and what is missing, so that everyone learns from each other the best way to start the problem solving process.

Once everyone has a good feel for what it is they are looking for, we let them loose on the Internet to see what they can find. They do some searching and find some web sites that they think they like, with the instructors again milling around to see how the students are doing. We have not yet found a situation where at least one student in the group hasn't done appreciable web searching before, but we do provide links to some popular web search engines just in case. It is during this informal searching process that the instructors can explain concepts of narrowing, focusing results, etc., at the point of need, when students care about those concepts.

The student groups find web sites of interest and write down what they've learned from them. We then pass out a list of criteria for evaluating web sites and ask the groups to exchange papers and evaluate the other group's web sites. This leads to good discussions, since we ask the evaluators to present examples of especially good and bad web sites to the rest of the class, and articulate why they classified them as such.

We duplicate the process, using databases to find journal articles. We provide links to databases for the students and let them start searching. When they run into conceptual problems, or difficulties with the interface, the instructors address those issues at the point of need, bringing in conceptual issues at those times. For example, why does one get so many fewer hits in an article database than a web search engine? How can one use the structure of the database to get better focused and more reasonable results? Mini-lectures on concepts, when the concepts have been brought up by the students as needing clarification, are the way structured instruction can be effectively given. By comparing their results for journals and web sites, the students begin to understand how those publication types are different and the most appropriate uses of each.

By the end of the laboratory session, which takes between two and three hours in total, the students will have determined the nature and extent of their problem and articulated their 'learning issues.' They have found a handful of web sites and journal articles that inform their problem. All that is left for them to do is synthesize this information and create a presentation for the next lab. We have scheduled this lab the week before our October Break, since there are no lab classes the week of the 'Break', so that the students have an extra week to prepare their presentations.

RESULTS

Several measures of success were reached for this information laboratory. First, the course instructors noticed a marked increase in the quality of term papers written for the class, compared to students from previous years who had no formal information literacy instruction. Second, self-evaluations by the students indicated that over 90% felt they could 'Find and Evaluate Information," "Find Scholarly Information," and "Properly Cite Information." Over three quarters could "Apply Skills Learned to Their Final Project," which is an indication that students figured out that there were universal concepts in finding, interpreting, and using information that transcended a specific laboratory exercise. Finally, over half of the students rated the 'Information Lab' as one of the top two labs in the course, and many students wrote comments about how much fun they had researching their special topic, and thought the exercise was very relevant to their interests. This is very gratifying, as it is often difficult to interest students in a typical 'library lecture.'

SCALABILITY

Each year the implementation of this introductory course has changed. The first year, Alexius Macklin and I taught two information labs (one on problem solving and web searching, the other on finding journal articles), to four sections of students. This involved twenty-four contact hours, not including listening to and grading the student presentations (another twenty four hours). The following year, we merged the two information labs into one, halving the amount of contact time needed for the course. Carolyn Laffoon and I facilitated those labs. Last year, we trained the course TA's to administer the lab, letting them act as the lead facilitators, with Carolyn Laffoon acting as a facilitator and providing backup for the TA's. At the outset the course was very time intensive, but it has become increasingly manageable as we've learned more about and become more comfortable with the whole process of problem-based learning.

ADVANCED COURSE

I have extended the information lab concept to more advanced students, creating an information lab for a mineralogy course. In that course, students need to identify an unknown mineral, and write a report on its properties, uses, etc., as kind of a term paper for the class. For this project, students first brainstorm what specific pieces of information they need to find in order to write their report (in a less formal KND process). Then, once they know their 'learning issues,' I split them up into small groups and give them different kinds of reference works to dig into. The students figure out how the information about their mineral is laid out in the reference work and how much and what kind of information is contained therein. That way the students teach each other about the specialized resources of their field.

Since reference books do not contain all the information the students need for their projects, the class determines what information is left to find, and then goes to the web and the journal literature to find it. Students in this class have already gone through the introductory-level information lab, so this provides a refresher for students in evaluating web sites. As the most popular web sites for minerals are those concerned with spiritual healing properties of minerals and those that are selling minerals, there is ample room for discussions of authority, purpose, and bias those web sites. And, indeed, finding their way through the more commercial web sites to ones that have more useful information is good practice for all levels of web searchers.

CONCLUSIONS

Information labs certainly promote a hands-on way of learning both information skills and content relevant to the students' course work. The students have self-identified that they enjoy the labs, they learn important information literacy skills, and they can transfer those skills from their immediate assignment to projects that they will encounter throughout their academic careers.

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